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EXAMINER	
SNOW, COLLEEN ERIN	
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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KIE Y. AHN and LEONARD FORBES

Appeal 2009-009853
Application 09/945,535
Technology Center 2800

Before JOSEPH F. RUGGIERO, MAHSHID D. SAADAT,
and MARC S. HOFF, *Administrative Patent Judges*.

SAADAT, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

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[1] The two month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304 or for filing a request for rehearing as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

Appellants appeal under 35 U.S.C. § 134(a) from the final rejection of claims 1, 2, and 6-9. Claims 3-5 and 10-61 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

STATEMENT OF THE CASE

Appellants' invention relates to a method of forming a gate oxide by oxidizing a metal layer from the group IVB elements, wherein the metal layer includes zirconium (Zr) (Spec. 4:10-17).

Independent claim 1 is illustrative of the invention and reads as follows:

> 1. A method of forming a gate oxide on a transistor body region, comprising:
>
> evaporation depositing a substantially amorphous and 0.99999 pure single element metal layer directly contacting a single crystal semiconductor portion of the body region using electron beam evaporation at a temperature between 150 to 200 °C, the metal being chosen from the group IVB elements of the periodic table; and
>
> oxidizing the metal layer to form a metal oxide layer directly contacting the body region, wherein the metal oxide layer is amorphous and has a smooth surface with a surface roughness variation of 0.6 nm.

The Examiner rejected claims 1, 2, 6, and 7 under 35 U.S.C. § 103(a) over the combination of Ma (US 6,207,589 B1), Park (US 5,795,808), and Yano (US 5,810,923). The Examiner also rejected claims 8 and 9 under 35 U.S.C. § 103(a) over the combination of Ma, Park, and Yano in view of Moise (US 6,211,035 B1).

ANALYSIS

In rejecting claim 1, the Examiner finds that Ma discloses a method of forming a gate oxide layer by evaporation depositing and oxidizing a substantially amorphous, pure metal layer (Ans. 3-4). The Examiner asserts that while the metal layer is described to include a trivalent metal in the range of approximately 0 to 50%, Ma discloses a substantially pure single metal layer based on the disclosed range (Ans. 8-9).

Appellants contend that the Examiner erred in concluding that the metal layer in Ma is formed of a pure single metal because the Zr layer is taught to have up to 50% of trivalent metal such as aluminum (Al), with 25% as the preferred level (App. Br. 11; Reply Br. 3). Appellants conclude that such teachings indicate that the metal layer disclosed in Ma cannot have 0% aluminum or be made of pure single metal (App. Br. 11; Reply Br. 3). Appellants further point out that Ma discusses the benefits of aluminum doping for preventing crystalline formation which allows forming smaller geometry transistors (App. Br. 11).

As asserted by Appellants, Ma discloses a method of forming a doped metal oxide film as a high-k dielectric made of Zr or hafnium (Hf) doped with a trivalent metal such as Al (Abstract). Ma further specifies the percentage of the aluminum doping to be between approximately 0 and 50% and preferably at 25% (col. 5, ll. 65-67), which precludes a pure single metal layer of Zr or Hf. Contrary to the Examiner's assertion (Ans. 9), while Ma may not indicate that a non-doped metal oxide is unsuitable, the description of Figure 2 of Ma in column 4, lines 56-59, explicitly refers to an Al-doped ZrO_2 film which is different from the 0.99999 pure single element metal layer recited in claim 1.

CONCLUSION

The Examiner erred in rejecting claim 1 as being obvious because the combination of Ma, Park, and Yano fails to teach or suggest the recited 0.99999 pure single element metal layer. Independent claim 9 includes a similar limitation, which was discussed above and determined not to be taught or suggested by the combination of references. Because the Examiner has not identified any teachings in Moise to cure the above-noted deficiency of Ma, we do not sustain the obviousness rejection of independent claims 1 and 9, as well as claims 2 and 6-8 dependent thereon.

ORDER

The Examiner's decision rejecting claims 1, 2, and 6-9 is reversed.

REVERSED

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